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ABSTRACT

This report discusses access issues related to distance learning for individuals with disabilities and presents design considerations for assuring that a course is accessible to potential instructors and students with a wide range of disabilities. The field of universal design provides a framework for this discussion. It begins by describing examples of access challenges faced by students and instructors with different disabilities in typical distance learning courses. Challenges faced by students with blindness, visual impairments, specific learning disabilities, mobility impairments, hearing impairments, speech impairments, and seizure disorders are discussed. The concept of universal design is then introduced and strategies are provided for making distance learning courses accessible to everyone. Strategies are provided for on-site instruction, Internet-based communication, Web pages, printed materials, video presentations, and telephone conferences. The benefits of accessible design for people without disabilities are also explored. A list of 21 additional Web-based resources is provided. (CR)

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Sheryl Burgstahler

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Real Connections: Making Distance Learning Accessible to Everyone

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By Sheryl Burgstahler, Ph. D.

Distance learning has been around for a long time. For hundreds of years instructors have taught students across great distances via correspondence courses using printed materials. The early days of television witnessed the introduction of televised courses. Today, in a specially equipped facility, an instructor can teach several classrooms full of students brought together through interactive television. Early on-line courses using electronic mail were rapidly followed by Web-based instruction. Today, the lines are blurred between different types of distance learning courses as multiple modes of delivery are employed in a single course. For example, a class "library" could be a Web site; class discussions could take place using electronic mail; some course content could be delivered using printed materials and television; and the final activity could be a place-bound proctored exam.

Increasing access to more students is a common reason given for providing instruction in a distance learning format. However, these access arguments usually focus on people separated by distance and time and rarely include consideration of students with disabilities. In fact, the design of many distance learning courses erects barriers to the full participation of students and instructors with some types of disabilities.

Assuring that individuals with disabilities can participate in distance learning courses can be argued on ethical grounds. Many people simply consider it to be the right thing to do. Others are more responsive to legal mandates. The Americans with Disabilities Act (ADA) of 1990 requires that people with disabilities have equal access to public programs and services. According to this law, no otherwise qualified individuals shall, solely by reason of their disabilities, be excluded from the participation in, be denied the benefits of, or be subjected to discrimination in these programs. The ADA does not specifically mention distance learning courses. However, the United States Department of Justice clarified that the ADA applies to Internet-based programs and services by stating, "Covered entities that use the Internet for communications regarding their programs, goods, or services must be prepared to offer those communications through accessible means as well" (ADA Accessibility, 1996). Clearly, distance learning programs must make their offerings available to qualified people with disabilities.

The following paragraphs discuss access issues and present design considerations for assuring that a course is accessible to potential instructors and students with a wide range of disabilities. The field of universal design provides a framework for this discussion.

Access Barriers

Thousands of specialized hardware and software products available today allow individuals with a wide range of abilities and disabilities to productively use computing and networking technologies (Closing the Gap, 2001). However, assistive technology alone does not remove all access barriers. Described below are examples of access challenges faced by students and instructors in typical distance learning courses.

EC 309531

Blindness
A student or instructor who is blind may use a computer equipped with screen reader software and a speech synthesizer. Basically, this system reads with a synthesized voice whatever text appears on the screen. He may use a Braille refreshable display that prints screen text line by line. He can use a text-only browser to navigate the World Wide Web or simply turn off the graphics-loading feature of a multimedia Web browser. He cannot interpret graphics (including photographs, drawings, and image maps) unless text alternatives are provided. Printed materials, videotapes, televised presentations, overhead transparencies, and other visual materials also create access challenges for him. These barriers can be overcome with alternative media such as audiotapes, Braille printouts, electronic text, tactile drawings, and aural descriptions.

Other Visual Impairments
A student or instructor who has limited vision can use special software to enlarge screen images. He may see only a small portion of a Web page at a time. Consequently, he can easily become confused when Web pages are cluttered and when the page layout changes from page to page. Standard printed materials may also be inaccessible to him; he may require large print or electronic text. Individuals who are colorblind cannot successfully navigate Web pages or understand content when distinguishing between colors is required.

Specific Learning Disabilities
Some specific learning disabilities impact the ability to read, write, and process information. A student with a learning disability may use audiotaped books. To help her read text efficiently, she may also use a speech output and/or a screen enlargement system similar to those used by people with visual impairments. She may have difficulty understanding Web sites when the information is cluttered and when the screen layout changes from one page to the next.

Mobility Impairments
A student or instructor with a mobility impairment may not be able to move his hands; he may use an alternative keyboard and mouse or speech input to gain access to Internet-based course materials and communication tools. Another student or instructor may be able to use standard input devices, but lack the fine motor skills required to select small buttons on the screen. If his input method is slow, a person with a mobility impairment may not be able to effectively participate in real-time "chat" communications. If any place-bound meetings are required in a distance learning course, a participant with a mobility impairment may require that the location be wheelchair-accessible.

Hearing Impairments
Most Internet resources are accessible to people with hearing impairments because these resources do not require the ability to hear. However, when Web sites include audio output without providing text captioning or transcription, a student who is deaf is denied access to the information. Course videotapes

that are not captioned are also inaccessible to this student. He may also be unable to participate in a telephone conference or videoconference unless accommodations (e.g., sign language interpreters) are provided for that part of a distance learning course.

Speech Impairments
A student with a speech impairment may not be able to effectively participate in interactive telephone conferences or videoconferences. However, modes of participation that do not require the ability to speak, such as electronic mail, are fully accessible.

Seizure Disorders
Some attention-grabbing features of Web pages include flickers. Flickers at certain rates (often between 2 to 55 hertz) can induce seizures for people who are susceptible to them.

Universal Design

Visual, hearing, mobility, speech, and learning disabilities can impact the participation of potential students and instructors in a distance learning class. Planning for access as the course is being developed is much easier than creating accommodation strategies once a person with a disability enrolls in the course or applies to teach it. Simple steps can be taken to assure that the course is accessible to participants with a wide range of abilities and disabilities. People without disabilities also benefit when universal design principles are applied as a course is being developed.

"Universal design" is defined by the Center for Universal Design at North Carolina State University as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design." *(http://www.design.ncsu.edu/cud/univ_design/ud.htm)* At this Center, a group of product developers, architects, environmental designers, and engineers established a set of principles of universal design to apply in the design of products, environments, and communication and other electronic systems. General principles include: the design is useful and marketable to people with diverse abilities; the design accommodates a wide range of individual preferences and abilities; the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities; the design can be used efficiently and comfortably, and with a minimum of fatigue; and appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

When designers apply these principles, their products meet the needs of potential users with a wide variety of characteristics. Disability is just one of many characteristics that an individual might possess. Others include height, age, race, native language, ethnicity, and gender. All of the potential characteristics of participants should be considered when developing a distance learning course. Just as architects design buildings used by everyone, including those who use wheelchairs, distance learning

designers should create learning environments that allow all potential students and instructors to access course content and fully participate in activities.

The next sections of this publication provide examples of strategies for making distance learning courses accessible to everyone. Be sure to include a statement on all program promotional materials about how to obtain materials in alternate format and how to obtain disability-related accommodations.

On-Site Instruction

The interactive video sessions, proctored examinations, and retreats for students in some distance learning courses require place-bound meetings. In these cases, the facility should be wheelchair accessible, the furniture should be flexible enough to accommodate wheelchair-users, and accessible restrooms and parking should be available nearby. Standard disability-related accommodations, such as sign language interpreters, should be provided when requested. Instructors should speak clearly; face students when speaking (to facilitate lipreading); and read aloud and describe text and other visual materials (for those who cannot see them).

Internet-based Communication

Some distance learning programs employ real-time chat communication in their courses. In this case, students communicate synchronously (at the same time), as compared to asynchronously (not necessarily at the same time). Besides providing scheduling challenges, synchronous communication is difficult or impossible for someone who cannot communicate quickly. For example, someone with a learning disability who takes a long time to compose her thoughts or someone with Cerebral Palsy whose input method is slow may not be fully included in the discussion. Instructors who choose to use this type of tool should provide an alternate, equivalent method of communication (e.g., e-mail) for those who cannot fully participate using synchronous communication methods.

Text-based, asynchronous resources such as electronic mail, bulletin boards, and listserv distribution lists generally erect no special barriers for students with disabilities. If a prerequisite to a course is for students to have access to electronic mail, individuals with disabilities can choose an accessible e-mail program to use. A student who requires assistive technology to access e-mail will have resolved any basic system access issues before enrolling in the course. His own computer system will provide whatever accommodations he needs. E-mail communication between individual students, course administration staff, the instructor, guest speakers, and other students is accessible to all parties, regardless of disability.

Web Pages

Applying universal design principles to the design of Web pages makes them accessible to individuals with a wide range of disabilities. In 1999, guidelines for making Web pages accessible were developed by the Web Accessibility Initiative (WAI) of the World Wide Web Consortium (W3C). W3C, an industry group that was founded in 1994 to develop common protocols that enhance

interoperability and guide the evolution of the Web, is committed to assuring that the World Wide Web is fully accessible to people with disabilities. More recently, the United States Architectural and Transportation Barriers Compliance Board (Access Board) developed standards for Web pages of Federal agencies as mandated by Section 508 of the Rehabilitation Act Amendments of 1986. The standards provide a model for other organizations working to make their Web pages accessible to the broadest audience.

There are basically two approaches for making Web page content and navigation accessible. Certain types of inaccessible data and features need to be avoided or alternative methods need to be provided for carrying out the function or accessing the content provided through an inaccessible feature or format. For example, a distance learning designer can avoid using a graphic that is inaccessible to individuals who are blind, or he can create a text alternative for the content that is accessible to the screen readers used by those who are blind. Web pages for a distance learning class should be tested with a variety of monitors and computer platforms. They should also be tested using a variety of Web browsers, including a text-only browser, such as Lynx, or a standard browser with the graphics and sound-loading features turned off to simulate the experiences of people with sensory impairments. Testing to see if all functions at a Web site can be accessed using a keyboard alone is also a good accessibility test. Special programs (e.g., A-Prompt, Bobby, WAVE) are available to test Web pages for accessibility.

If you are using development tools, such as Blackboard or WebCT, be sure to use the accessibility features to design an accessible course.

Printed Materials

Students who are blind or who have specific learning disabilities that affect their ability to read may require that printed materials be converted into Braille, large print, audiotape, or electronic formats. Making the text of printed materials available on-line may provide the best solution for students who cannot read standard printed materials.

Video Presentations

Ideally, whenever a videotape or televised presentation is used in a distance learning course, captioning should be provided for those who have hearing impairments and audio description (that describes aurally the visual content) should be provided for those who are blind. If the publisher does not make these options available, the distance learning program should have a system in place to accommodate students who have sensory impairments. For example, the institution could hire someone local to the student to describe the visual material to a blind student or to sign audio material for a student who is deaf. Real-time captioning (developed at the time of the presentation) or sign language interpreting should be provided when requested by participants in videoconferences who are deaf.

Telephone Conferences

Sometimes, on-line courses include telephone conferencing opportunities for discussion in small groups. This mode of communication creates scheduling challenges for everyone. It is also inaccessible to a student who is deaf. Instructors who use telephone conferencing for small group discussions should allow alternative communication (e.g., e-mail) that is accessible to everyone in a specific group. Or, a student who is deaf might be able to participate in a telephone conference by using the Telecommunications Relay Service (TRS),

where an operator types what the speakers say for the deaf student to view on his text telephone (TTY) and translates his printed input into speech, however this system might be too slow to allow participation in lively conversations. Another accommodation involves setting up a private chat room on the Web. A transcriptionist types the conversation for the deaf student to view. The student can also type his contributions into the chat room and they can be voiced by someone in the group who is monitoring the chat room. Various options should be discussed with the student who has a need for an accommodation.

Benefits of Accessible Design for People without Disabilities

People without disabilities may have temporary and/or situational limitations that are similar to the limitations imposed by disabilities. For example, people who cannot access graphics due to computer system limitations are in a similar situation as students who are blind. A noisy environment that prohibits the use of audio features imposes constraints similar to those faced by students with hearing impairments. Those for whom English is a second language experience reading difficulties similar to those experienced by people with some types of learning disabilities. Individuals using monochrome monitors face limitations like those who are colorblind. People who need to operate a computer but whose hands are occupied with other activities face challenges similar to those who use a hands-free input method because of a disability.

Applying universal design principles assists both people with and people without disabilities. For example, using clear and simple language and navigational mechanisms on Web pages facilitates use by those whose native language is not the one in which the course is taught as well as people with visual and learning disabilities. People who have turned off support for images on their browsers in order to maximize access speed benefit when multimedia features provide text alternatives for the content, as do people who are blind. Similarly, people who cannot view the screen because they must attend to other tasks benefit from speech output systems that are often used by people who are blind. Captions provided on videotapes and video clips assist people who work in noisy or noiseless surroundings and people for whom English is a second language along with people who have hearing impairments. Making sure that information conveyed with color is also available without color benefits those using monochrome monitors in addition to those who are colorblind. Providing multiple formats of information also addresses differences in learning styles.

Getting Started

Be proactive in making distance learning courses accessible. Don't wait until someone with a disability enrolls to address accessibility issues; consider them from the start!

- Think about the wide range of abilities and disabilities potential students might have.
- In promotional publications include information on how to request accommodations and publications in alternative format.
- Make sure media can be accessed using sight or hearing alone.
- Arrange accessible facilities for any on-site instruction.
- Be prepared to offer additional accommodations as requested.

Distance learning program administrators should adopt and enforce accessibility standards (e.g., the Section 508 or WAI standards for Web accessibility) for their

course materials and strategies. They should also establish procedures for students with disabilities to request and receive accommodations. Administrators should provide information about standards, training, and support to key staff. Course developers should use the accessibility features of development tools they use (e.g., Blackboard™, WebCT™) and avoid including design features that are inaccessible to students with disabilities. Standards, procedures, and support issues should be reviewed and updated periodically.

Conclusion

Distance learning courses are designed to reach out to students from anywhere. If universal design principles are used in creating these classes, they will be accessible to any students who enroll in them and any instructors who are hired to teach them. Designed correctly, distance learning options create learning opportunities for students with a broad range of abilities and disabilities. Designed poorly, they erect new barriers to equal participation in academics and careers. Employing universal design principles can bring us closer to making learning accessible to anyone, anywhere, at any time.

Resources

The following resources are useful to those who wish to research this topic further.

Americans with Disabilities Act of 1990
http://www.usdoj.gov/crt/ada/adahom1.htm

ADA accessibility requirements apply to Internet Web pages. (1996). The Law Reporter, 10(6), 1053-1084.

A-Prompt
http://aprompt.snow.utoronto.ca/

Blackboard
http://www.Blackboard.com/

Bobby
http://www.cast.org/bobby

Captioned Media Program
http://www.cfv.org/

Center for Applied Special Technology (CAST)
http://www.cast.org/udl/

The Center for Universal Design
http://www.design.ncsu.edu/cud/

Closing the Gap 2001 Resource Directory
http://www.closingthegap.com/

DO-IT
http://www.washington.edu/doit/

EASI (Equal Access to Software and Information)
http://www.rit.edu/~easi/

International Center for Disability Resources on the Internet
http://www.icdri.org/

National Center for Accessible Media (NCAM)
http://ncam.wgbh.org/

Recordings for the Blind and Dyslexic
http://www.rfbd.org/

Section 508 Standards of the Access Board
http://www.access-board.gov/sec508/508standards.htm

Trace Research and Development Center
http://www.trace.wisc.edu/world/

Vanderheiden, G.C. (1990). Thirty-something million: Should they be exceptions? Human Factors, 32(4), 383-396.
http://www.trace.wisc.edu/docs/30_some/30_some.htm

WAVE (Web Accessibility Versatile Evaluator)
http://www.temple.edu/inst_disabilities/piat/wave/

Web Accessibility Initiative, World Wide Web Consortium
http://www.w3.org/WAI/

WebABLE
http://www.webable.com/

WebCT
http://www.WebCT.com/

To locate technical assistance centers in your state or region, consult *http://www.resna.org/taproject/at/statecontacts.html* or *http://www.adata.org/dbtac.html*, respectively.

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